



## Course Regime

Course: Biology of the Cell

Study Programme:

**Medicine**                  Dental Medicine

Year of the Course: 1   2   3   4   5   6

Semester:

**Winter**                  Summer

Course type:

**Compulsory**              Elective

Number of ECTS credits: **9**

Lecturer(s): **Prof. Peter Veranič, Prof. Mateja Erdani Kreft**

Participating Organisational Units (Departments and Institutes):

**Institute of Cell Biology**

Parts (Modules) of the Course

- 1:
- 2:
- 3:
- 4:

Date of Issue: September 2018

## **A. General part** (*applies to compulsory and elective courses*)

### **1. Course objectives**

Students learn about the basic characteristics of the structure and functioning of the cell, cellular organelles and complex molecular structures in cells, in particular the role of communication within the cell, between cells and the cellular environment. They learn about the rules of inheritance according to Mendel's laws and examples of deviations from Mendel's laws. They acquaint themselves with cell-biological methods. There is a focus on understanding the concepts and basic principles of functioning at the level of cells and tissues.

### **2. Comprehensive outline of the course organisation**

The course includes lectures and exercises. Presence at the exercises is mandatory. In the case of justified absence from exercises, exercises should be carried out afterwards.

### **3. Description of on-going assessment of knowledge and skills**

Colloquium Mode:

Students can take part at colloquium exams during semester or before each exam, except before the first examination deadline. The practical skills are examined in three ways a) theoretical, b) practical and c) computational tasks from genetics. Exercises are successfully passed, if the student achieves  $\geq 60\%$  ( $\geq 50\%$  in the case of negative deductions \*) for each set of possible points. The colloquium consists of 10 to 30 questions, which are of multiple choice and / or essay type. Students who achieve  $\geq 80\%$  of points in each of the partial colloquiums will receive 10% plus points at the written part of the exam. Students do not have to apply for partial colloquiums and apply only for colloquium before the exams at the Institute of Cell Biology at least seven days before the deadline for the colloquium.

### **4. Required conditions for the final examination (Course Exam)**

A condition for taking the exam from the Biology of the Cell subject is a positive grade of practical skills in this subject. In the first and second examinations, a written examination ( $\geq 60\%$  of possible points,  $\geq 50\%$  in the case of negative deductions \*) is a condition for taking the oral exam. In the following exams, the student can take the oral part of the exam, even if not achieving a positive grade from the written part of the exam. The assessment of the written part of the exam is the starting point for the final assessment of the subject exam, which the student achieves at the oral part of the exam.

The student is applying for an exam through an information system. Access to the written part of the examination is allowed only to those students who are listed. The list is published on the website of the Institute of Cell Biology one working day before the exam. Oral examinations are conducted according to the schedule, which is published on the website of the Institute of Cell Biology up to three days after the written examination.

### **5. Final assessment and examination of knowledge and skills (Course Exam)**

Exams are written and oral. Written exam takes 45 minutes. - The exam consists of 20 to 50 questions, which are optional and / or essay type. - for essay questions, the maximum possible number of points achieved is between 1 and 15.

### **6. Other provisions**

The commission exam is conducted in the same way as a regular examination, but instead of one examiner, a commission of teachers is present.

## **7. Fundamental study material and Supplement reading**

Fundamental material

Jezernik K., Veranič P., Sterle M.: Celična biologija, DZS, 2018

Erdani Kreft M, Erman A, Hudoklin S, Resnik N, Romih R Zupančič D: Celična biologija, Medicinska fakulteta, Ljubljana 2018

Erman A, Hudoklin S, Erdani Kreft M, Resnik N, Romih R, Zupančič D: Celična biologija: Atlas mikrografij, Medicinska fakulteta, Ljubljana, 2015

## **8. Exam topics, clinical presentations and skills**

Subject of the course: Biological membranes, principles of membrane transport - coupling of various transport systems, intercellular contacts, cellular polarity and intercellular communications and message transmission. Cytoskeleton and cell movement; microtubules, actin and intermediate filaments. Abnormal structure and functioning of the cytoskeleton as the basis for the occurrence of certain diseases. Biosynthetic secretion pathway and endomembrane systems: endoplasmic reticulum, Golgi apparatus, vesicles and intracellular transport, lysosomes and degradation of macromolecules, exocytosis and exocytotic pathways. Endosomes and various pathways how macromolecules enter the cell. Normal and abnormal course of exo- and endocytosis. Organisms of energy conversion: mitochondria as semiautonomous organelles. The core as the carrier of the genome and the control center of the cell. Definition of the genome and type of genes in the genome. Nucleus in interphase, transport to / from the nucleus, nuclear pores, chromatin, spiralization levels and chromatin condensation, chromosomes. Gene, chromosomal and genomic mutations. Epigenetic modifications. Parental imprinting of genes. Cell cycle control: phase cycles, control points and signal transduction in normal and cancerous cells, DNA replication, telomeres, mitotic and meiotic cell division. Homologous recombination in meiotic and repair mechanisms. Nonhomologous recombination. Cellular aging, cell death as a balance to cell division, necrosis, and apoptosis. Mendel's laws, different types of inheritance: autosomal dominant and recessive, sexually bound inheritance on X chromosome (dominant and recessive) and Y chromosome. Deviations from the validity of Mendel's laws. Mitochondrial, polygenic and multifactorial inheritance. Genetic polymorphism and the basis of immunogenetics. Primordial, stem cells, spermatogenesis and oogenesis. Cellular and molecular basis of fertilization, sex determination. Early stages of embryonic development.

## **9. Other information**

The student has an opportunity to inspect the written part of the exam or colloquium within 7 working days after publishing the results. The inspection of the written part of the exam is agreed beforehand by an e-mail with the lecturer.

